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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/550,423	10/24/2005	Peter Andrin	DC8507 US PCT 1	3310

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Thomas W Gorman
E I Du Pont De Nemours and Company
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4417 Lancaster Pike
Wilmington, DE 19805

EXAMINER

LAIOS, MARIA J

ART UNIT	PAPER NUMBER
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1727

MAIL DATE	DELIVERY MODE
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03/14/2011

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/550,423	Applicant(s) ANDRIN ET AL.	
	Examiner MARIA J. LAIOS	Art Unit 1727	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 1/29/2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) _____ is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,4 and 12-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 29 January 2010 has been entered. Claim 1 has been amended; claims 3, 5-11 and 22-24 are cancelled; claims 1, 2, 4, 12-21 are currently pending.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 103

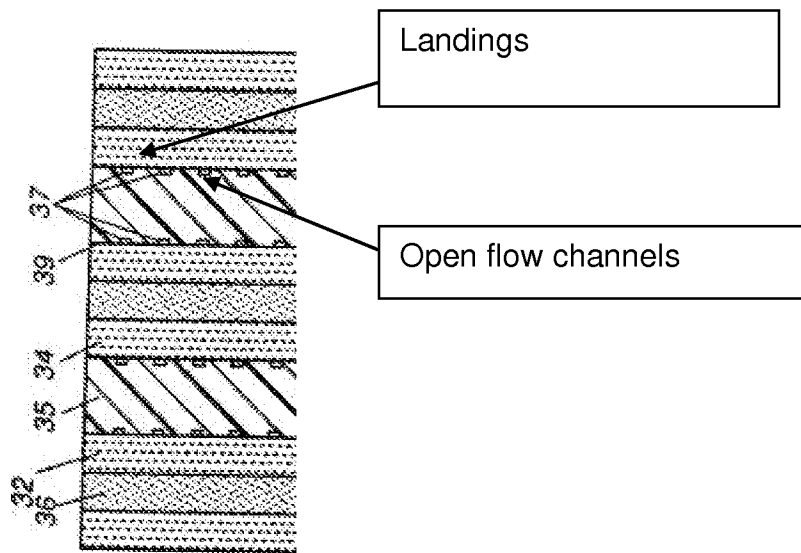
3. Claims 1, 2, 4, 14-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Davis (GB 2 326 017 A) in view of Sugita et al. (US 6,455,179 B1).

With respect to claim to claim 1, 2, 4, 14 and 20-21, Davis discloses an electrochemical cell (fuel cell, as applied to claims 20, multiple cells are disclosed in figure 3, as applied to claim 21) comprising electrodes (32-anode and 34-cathode) with an electroconductive separator plate (35-bipolar plate) comprising at least one landing surface formed on a surface of the electroconductive separator plate, and the electroconductive separator plate and land surface comprising a thermoplastic polymer

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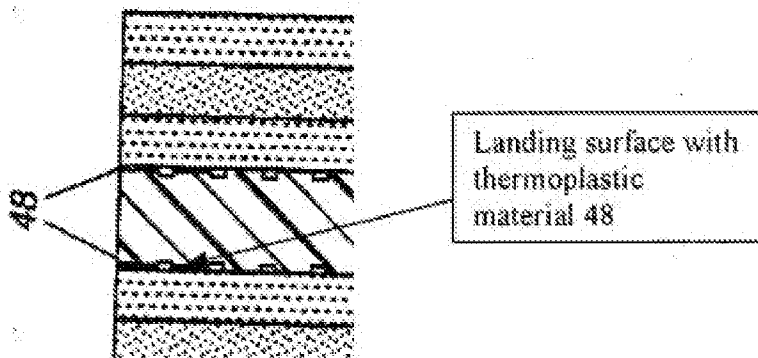
(page 5 lines 9 discloses the thermal plastic as polyamides as applied to claim 4) and a conductive filler (Page 4 lines 33, carbon fiber or carbon powder, as applied to claim 14) wherein the first surface of the gas diffusion layer is joined to the separator plate by localized impregnation of some of the thermoplastic polymer on the landing surface with in the pores of the porous body so the electrical contact between the filler and the electrode is maintained (Page 6 lines 6-27, as the bipolar plate becomes heated it will fuse with in the porous electrode. Since the thermoplastic polymer on the landing surface is impregnated into the porous body of the electrode the plurality of welds are spaced along the surface of the porous body. Because the welds are formed on the landings the welds are formed in between the channels.

Davis discloses the bipolar plate comprising landing surfaces separated by open flow field channels (see figure below) and discloses applying heat to fuse to the anode and cathode (Page 6 lines 5-7). Davis fails to explicitly disclose that the porous electrode has a discrete gas diffusion layer.



Sugita et al. discloses a fuel cell and teaches the electrodes (40, 42) are abutted to the gas diffusion layers (44, 46) which are abutted to the separator plate (34, 36) in order for the gases to diffuse through the layers. It would have been obvious for one of ordinary skill to include a gas diffusion layer of Sugita et al. to the porous electrode of Davis because this ensures an efficient entry passage for the gases.

With regard to claim 15-17, Davis discloses a thermoplastic bipolar with a thin layer of thermoplastic material/polymer rich material (48, polyethylene or polypropylene) on top of the landing surface (Figure 4, shown below). Since the thermoplastic material is disclosed as polyethylene or polypropylene it is polymer rich at 100 weight percent polymer.



With respect to claim 18, the electrochemical cell component of Davis inherently has a resistivity less than a resistivity of a system comprising a gas diffusion layer that is not welded to the separator.

With respect to claim 19, Davis discloses fusing the bipolar plate to the MEA which would indicate that the gas diffusion layer does not sink into the open flow field channels of the separator plate (Page 6 lines 5-10).

4. Claims 12 and 13 rejected under 35 U.S.C. 103(a) as being unpatentable over Davis (GB 2 326 017 A) in view of Sugita et al. (US 6,455,179 B1) as applied to claim 1 above, and further in view of Takagi et al. (US 7,008,991 B2).

Davis discloses the component as discussed above and incorporated herein but fails to disclose a blend of 1 to 30 or 5 to 25 weight percent of maleic anhydride modified polymer with a liquid crystalline polymer and fluorinated polymer.

Takagi et al. discloses a thermoplastic resin composition with a composition of Component A, which is a thermoplastic resin such as styrene-maleic anhydride copolymer (col. 2 lines 26 and 27, styrene-maleic anhydride copolymer (col. 3 lines 14-36), Component B is a liquid crystal thermoplastic (col. 2 lines 46-47, col. 6 lines 23-26)

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and Components C and D are conductive carbon black (col. 8 lines 12-17) which can be molded for materials that require conductivity (col. 10 lines 43-46). The amount of component A with respect to component B affects the mechanical strength and moldability (col. 9 lines 7-27). The amount of component A is 5-65 parts by weight and component B is 95 to 35 parts in 100 parts by weight of the two thermoplastic resins combined (col. 9 lines 15-20). Takagi does not disclose the specific range of 1-30 weight percent.

Davis and Takagi are analogous art because both are from the same problem solving area of using a molded resin compound for electrical conduction. It would have been obvious to one of ordinary skill in the art at the time of the invention was made to use the polymer composition of Takagi in the fuel cell separator of Davis because the polymer compound of Takagi is suitable for molded components requiring excellent conductivity and strength. See MPEP 2144.07. See *In re Boesch*, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980). The use of the resin for bipolar plate is a case of prima facie obviousness. *In re Sinclair*, 325 U.S. 327, 65 USPQ 297 (1945).

It would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the percentages of the two thermoplastic components (maleic anhydride polymer and liquid crystalline polymer) of Takagi through routine experimentation as the weight ratios affect mechanical strength and moldability. As to optimization results, a patent will not be granted based upon the optimization of result effective variables when the optimization is obtained through routine experimentation unless there is a showing of unexpected results which properly rebuts the prima facie

case of obviousness. *See In re Boesch*, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980). The use of the resin for bipolar plate is a case of prima facie obviousness. *In re Sinclair*, 325 U.S. 327, 65 USPQ 297 (1945).

Response to Arguments

5. Applicant's arguments filed 29 January 2010 have been fully considered but they are not persuasive.

Applicant argues that the Examiner has not accorded sufficient weight to the negative teachings contained in Davis with respect to four factors which are: Low cost; Simplified Physical construction; Reduced size; and Elimination of elements. Applicant also argues that the addition of a gas diffusion layer would run contrary to the entire theory and execution of Davis's fuel cell.

Davis discloses that the costs are attributed to fabricating the carbon bipolar plate, the use of sealing means such as o-rings or exterior gaskets, then assembling it into the fuel cell assembly is significant due to the materials and labor involved (Page 3 lines 1-5). Davis further teaches reducing cost by employing a thermoplastic bipolar plate instead of a carbon plate which requires machining the channels (Page 5 lines 28-33). Davis teaches simplifying the physical construction by removing gaskets or seals (Page 3 lines 28-30) which are not needed since the electrolyte is a membrane instead of a liquid electrolyte (Page 4 lines 9-10). Davis teaches that reducing the size is accomplished by removing the seals (Page 6 lines 7-13). Davis teaches the elimination of elements such as machined carbon blocks and o-rings (Page 6, line 13).

The Examiner notes Applicant's arguments of 1/7/2008 p7 contradict applicant's argument of 1/29/2010 p 8 therefore it is unclear as to the argument submitted.

Davis focuses on removing the cost by removing seals and changing the materials of the bipolar plate. Davis's fuel cell can function either with a liquid fuel, which does not require the GDL or a gaseous reactant which would require the GDL. Applicant noted that Davis does not distinctly disclose a GDL (1/7/2008-p. 7) therefore one of ordinary skill would understand a GDL would needed to be added if a gaseous reactant is used. Therefore Applicants argument against including a GDL is not persuasive because Davis clearly teaches gaseous reactants can be used.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MARIA J. LAIOS whose telephone number is (571)272-9808. The examiner can normally be reached on 11am-7pm Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan can be reached on 571-272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. J. L./
Examiner, Art Unit 1727

/Dah-Wei D. Yuan/
Supervisory Patent Examiner, Art Unit 1727